# *ON THOSE FIRMS IDENTIFIED BY VALUE LINE AS HAVING THE GREATEST THREE TO FIVE YEAR GROWTH POTENTIAL IN A PERIOD OF ECONOMIC RECESSION*

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**ABSTRACT**

In periods of economic recession, it may be expected that all firms, unless countercyclical, can expect some depreciation in value, particularly if they gained significant value during a preceding period of recovery. The year 2008 provided researchers with the opportunity to gather data from a period of economic recession and financial market turmoil that had been preceded by a period of relative stability. The group of firms identified by Value Line as having the greatest potential for growth during that recession will be of interest to financial analysts, academicians, managers, and investors. For the most part prior studies hav concentrated on potential changes in growth without regard to the underlying macroeconomic environment. This study resulted in the finding that the group of firms with high potential growth during that recessionary period had significant differences in the financial variables that establish value, when compared with firms selected at random from the same industries. As in previous studies of this nature Multiple Discriminant Analysis is used. **JEL Classification:** G32

**INTRODUCTION**

In periods of economic recession, and financial market turmoil, such as the year 2008, it may be logical to expect that all firms, unless countercyclical, can expect some potential depreciation in value, particularly if they gained significant value during such a preceding period of recovery. It simply cannot be expected that the average firm would be perceived as having very good expectations of growth potential in such a period. One of the more popular Value Line screens is their list of firms that have the greatest three to five year growth potential. Of course, the list is fluid. Firms move in

and out of the list as Value Line constantly considers new information and how that information or macroeconomic events might affect any company's growth potential. The firms that Value Line identified as having the greatest three to five year growth potential of any firms in their database in the year of 2008 may in some ways be an anomaly, and the determinants of the value of those firms are the subject of this study.

Firms that have experienced abnormal growth have been of interest to financial analysts, academicians, and investors for years (Basu, 1977; Goodman and Peavy, 1986, Merlicher and Miedich, 1985, 1987). Some of the earlier literature focused primarily on P/E ratios and financial returns (Basu, 1977; Goodman and Peavy, 1986), while others found significant positive relationships between sales growth rates and stockholder returns (Nerlove, 1968; Stano, 1976). Melicher and Miedich (1985, 1987) found a consistently positive relationship between sales growth rates and stockholder returns and that relationship continued to hold in a risk-return market framework. The only study to date focusing on financial characteristics of firms identified as having high growth potential is that of Payne (1993). While the importance of growth firms for investors is regularly recognized by Fortune, Business Week, and Value Line, there have been no studies that sought to identify the determinants of value for those firms identified as having the greatest three to five year growth potential in a recession and to compare those same determinants with companies chosen at random from the same industries and the same year. This study fills that important void. Significant differences in the variables that establish value, such as standard quantitative measures of risk and return, are expected between the two groups of companies.

## BACKGROUND

On November 26, 2008 then President-Elect Obama while introducing his new team of economic advisors said, "We are on the precipice of the greatest financial crisis since the great depression of the 1930's." A few days later the Business Cycles Dating Committee of the National Bureau of Economic Research (NBER) announced that the United States was not only in a recession, but that it had started a year earlier in December 2007 (NBER, November 26, 2008). Some large financial institutions such as Citigroup and American International Group (AIG) revealed major liquidity problems and seemed to be on the edge of bankruptcy. Merrill Lynch and Countrywide Financial were acquired by Bank of America, and Bear Sterns was acquired by J.P. Morgan-Chase. In addition, Lehman Brothers filed for bankruptcy protection. In the year 2007, there were three bank failures in the United States. In 2008 there were 25, and in 2009 there were 141 (Federal Deposit Insurance Corporation, December 18, 2009). One of the most significant results of these phenomena was that large and small banks across the country simply began limiting loans to customers with the very highest credit ratings resulting in a period of financial turmoil with very little credit for consumers, and high costs of capital for corporations. Remarkably, it was against this macroeconomic background that some companies were awarded the highest ratings for financial strength.

## PURPOSE

The purpose of this study is to identify the financial characteristics of the companies designated by Value Line as having the highest three to five year growth potential in their database in the aforementioned period, and to determine

whether those firms have financial profiles that are significantly different from firms select¬ed at random. More specifically, the study is concerned with those variables that are indicators of the firm's risk-return trade-off character, and a measure of how that risk-return trade-off is perceived by professional analysts and investors at the margin (those willing and able to buy). If such a profile is estab¬lished, and it can be validated without bias, it is suggested that it may be used to predict firms that will gain growth potential in a future period of economic recession and financial turmoil. This would have implications for lenders, financial managers, investors, invest¬ment counselors, and indeed, the entire market and business community.

## METHODOLOGY

The question to be resolved is one of classification or prediction and evaluation of the accuracy of that classification. Specifically, can firms be assigned on the basis of selected variables to one of two groups: (1) firms that have been identified as having the highest three to five year growth potential in the Value Line database in an economic recession, or (2) firms selected at random? Multiple Discriminant Analysis (MDA) provides a procedure for assigning firms to predetermined groupings on the basis of variables or attributes whose values may depend on the group to which the firm actually belongs. Since the purpose of this study is not just to analyze firms but to also predict which firms belong in each category, a multivariate analysis is needed. Altman (1968) first showed that sets of ratios used in multivariate analysis were better descriptions of the companies and had more predictive power than individual ratios used in univariate tests.

The use of MDA for the purpose of prediction is well established. It is appropriate when the dependent variables are nominally or ordinally measured. In this case, firms have either high growth potential or they do not. Thus they are nominally measured, and the independent variables are metrically measured. In addition to Altman's study predicting corporate bankruptcy, MDA has been used to predict financially distressed property-liability insurance firms (Treschmann and Pinches, 1973), the failure of small businesses (Edminister, 1982) and growth (Evans, 1987; Payne, 1993).

Since the objective of this study is to determine the discriminating capabilities of the entire set of variables, all the independent variables are entered simultaneously. The predictive power of the entire set of independent variables is thus measured (Hair et al, 2010). The computer program used to perform the analysis is SPSS 19.0 Discriminant Analysis.

## SELECTION OF SAMPLE AND INDEPENDENT VARIABLES

All data used in the analysis were gathered from Value Line Ratings and Reports. The Value Line database contains a screen of those firms having the highest growth three to five year growth potential in their database. The data were gathered from the year 2008. The sample of those firms selected for this study consists of two groups of fifty firms. The first group was identified by Value Line as firms having the greatest three to five growth potential in the aforementioned period and designated in this study as high growth potential firms (HGPF). The second group is a group of fifty firms randomly selected from the entire Value Line database, but from the same industries as the first group and designated in this study as randomly selected firms (RSF).

In periods of decline and recession all industries will not experience the same adverse effects. It follows that for an unbiased study, the effects of industry must

be held constant. This was accomplished by matching the companies in the HGPF group with companies from the same industry in the RSF group. For example, from the Drug Industry, Eli Lilly is in the HGPF group, and Forrest Laboratories is in the RSF group. From the Medical Services Industry, Aetna is in the HGPF group, and U.S. Oncology is in the RSF group. From the Machinery Industry Toro Corporation is in the HGPF group, and Caterpillar Incorporated is in the RSF group. Heartland Express is in the HPGF group from the Trucking Industry, and Swift Transportation is in the RSF group. In this manner each company identified by Value Line as having been identified as having the highest three to five year growth potential during this period was matched with a randomly chosen company, from the same industry. Thus, the matching method of randomly choosing, and matching companies from the same industries eliminates any bias due to differences in industry listings.

Previous studies using this and other statistical methods have chosen explanatory variables by various methods and logical arguments. In this study the group of explanatory variables chosen for analysis includes two measures that may identify returns to investors, two measures of risk, both of which would contribute to volatility in earnings and cash flows, a measure of what may be described as the lack of risk, an indicator of the value of the firm as perceived by investors at the margin (those willing and able to buy), and finally a measure that may contribute to a conclusion on the part of investors of whether or not it is reasonable to believe that growth in such a period as described here is possible. An evaluation of these measures is needed to accomplish the purpose of this study. A basic tenet of this study is that investors at the margin "trade off" indicators of risk and return to establish the value of the firms.

The measure of return is return to total capital. Return to total capital includes a return to creditors as well as owners, and recognizes that value is affected by the cost of debt. A measure of return to equity could be used, but it would ignore the cost of debt and the fact that debt as well as equity is used to finance assets. This is consistent with the use of the debt to total capital ratio as a measure of financial leverage.

Theoretically, if a firm has cash in excess of what it needs to maintain financing, the value of the physical plant, and provide a fair rate of return to all stakeholders that firm should calculate the present value of their growth opportunities (PVGO). If the firm's PVGO is less than what they perceive would be the PVGO for stockholders investing on their own, they should pay that cash out in dividends otherwise it should be retained (Bodie, Kane, and Marcus 2009). This textbook explanation may not be applicable in periods such as the one under study. Recall that the individual stockholders were also living in a recession with falling securities markets, and few reinvestment options. The key element of course, is that for whatever reason the firm has cash. If a firm is low on cash, as most companies are in recessions, there can be no question of potential growth. Thus, cash flow per share is included in the profile of explanatory variables. There is an aprori expectation that the firms that are in the HGPF in this period had, for whatever reason, greater than average positive cash flows. Thus, cash flow per share is included as a rough measure of return to investors.

There are two measures of risk. Sharpe's beta coefficients contain the effects of both operating and financial risk. Separate measures of financial and operating risk, (or leverage) are needed to establish the financial profile of a firm. The separation is accomplished by using Hamada's (1969) equation to "unlever" published betas. The unlevered beta is used as a measure of operating risk (operating leverage), and the long term debt to total capital ratio as the measure of financial

risk (financial leverage). The first measure of risk used in the model is the long term debt to total capital ratio. The second measure of risk is Hamada's unlevered beta. It may be logical to conclude that the HGPF firms may have less of both types of risk than the RSF since they have been identified as firms with high growth potential. That may not be the case however, and thus, there are no aprori expectations.

The fifth explanatory variable used in the model is the Value Line rating for stock price stability[1]. This measurement is based on the ranking of the standard deviation of weekly percent changes in the price of a stock over the past five years. It is defined in more detail in endnote number one. There is an aprori expectation that firms with lower price volatility will be classified in the HGPF group, and firms with higher volatility will be classified in the RSF group. The lack of price level volatility may be used as a measure of the absence of risk, or safety of investment. Safety of investment is always of interest to investors, investment counselors, financial managers, and academicians, and in periods of economic downturns it may become of paramount importance.

The ratio of market value to book value is used here as a measure of how the market perceives the value of the firm. This ratio has been shown to be of great significance in the identification of takeover targets (Payne and Heron 1985). There is no published evidence on how this measure of value is related to potential growth. However, logic would seem to lead one to the belief that in efficient markets, the higher the potential growth in any company in the macroeconomic environment described above, the greater would be the numerator (market price) and thus, the greater would be the value of the ratio. Thus there is an aprori expectation that the high market value to book value ratios will be characteristic of the HGPF group.

It is said that in periods of economic downturn the accuracy of earnings predictions may become of paramount importance. Graham, Campbell, and Rajgopal (2005) surveyed 401 financial executives, and conducted in-depth interviews with an additional 20, to determine the key factors that drive decisions related to performance measurement. They found that the majority of firms viewed earnings predictability as the key metric for an external audience, even more so than cash flows. They further found that the majority of managers would avoid initiating a positive net present value (NPV) project if it meant falling short of the current quarter's predicted earnings. They concluded that managers believe that anything that would reduce the accuracy of the predictability of earnings would in turn reduce stock prices because investors and analysts dislike uncertainty. If any firm is classified with high growth potential, the accuracy of the predictability of earnings would seem to be of great importance. Thus, Value Line's rankings for the predictability of earnings are included as an explanatory variable.[2] Investors at the margin "trade off" proxies for risk and return in buying and selling securities to establish demand and thus, price or market value. The stability implied by earnings predictability is simply one side of that tradeoff.

In sum, there are seven explanatory variables in the multiple discriminant model. They are as follows:

X1 - Return to Total Capital
X2 - Cash Flow Per Share
X3 - Hamada's Unlevered Beta (Operating Risk)
X4 - Long Term Debt to Total Capital (Financial Risk)
X5 - Value Line's Stock Price Stability
X6 - The Ratio of Market Value to Book Value
X7 - Earnings Predictability

The explanatory variable profile contains basic measures of common financial variables. They were chosen, as in any experimental design, because of their consistency with theory, adequacy in measurement, the extent to which they have been used in previous studies and their availability from a reputable source.

**TESTS AND RESULTS**

The discriminant function used has the form:

$$Z_j = V_1X_{1j}+V2X_{2j}+...+V_nX_{nj} \quad (1)$$

Where:
$X_{ij}$ is the $j^{th}$ firm's value for the ith independent variable.
$V_i$ is the discriminant coefficient for the firm's ith variable.
$Z_j$ is the jth firm's discriminant score.

The function derived from the data in this study and substituted in equation 1 is:

$$Z_j = .231+2.137X_{1j}+.216X_{2j}-1.245X_{3j}-.861X_{4j}+.002X_{5j}+.265X_{6j}-.016X_{7j} \quad (2)$$

Classification of firms is relatively simple. The values of the seven variables for each firm are substituted into equation (2). Thus, each firm in both groups receives a Z score. If a firm's Z score is less than a critical value, the firm is classified in group one (HGPF). Conversely, a Z score greater than the critical value will place the firm in group two (RSF). Since the two groups are heterogeneous, the expectation is that HGPF firms will fall into one group and the RSF firms will fall into the other.

Interpretation of the results of discriminant analysis is usually accomplished by addressing four basic questions:

1. Is there a significant difference between the mean vectors of explanatory variables for the two groups of firms?
2. How well did the discriminant function perform?
3. How well did the independent variables perform?
4. Will this function discriminate as well on any random sample of firms as it did on the original sample?

To answer the first question, SPSS provides a Wilk's Lamda – Chi Square transformation (Cooper and Schindler, 2000, 581). The calculated value of Chi-Square is 53.50. This exceeds the critical value of Chi-Square of 14.07 at the five percent level of significance, with 7 degrees of freedom. The null hypothesis that there is no significant difference between the financial profiles of the two groups is therefore rejected, and the first conclusion drawn from the analysis is that the two groups have significantly different financial characteristics. This result was of course, expected since one group consists of firms ranked highest in growth potential during in an economic recession and the other was chosen randomly.

The discriminant function thus has the power to separate the two groups. However, this does not mean that it will in fact separate them. The ultimate value of a discriminant model depends on the results obtained. That is what

percentage of firms is classified correctly and is that percentage significant?

To answer the second question a test of proportions is needed. Of the 50 firms in the HGPF group, 38 were classified correctly. Of the 50 firms in the RSF, 45 were classified correctly. That is, 83 firms or 83 percent were classified correctly. The results are shown in Table 1.

Of course 82 percent is significant, but formal research requires the proof of a statistical test. To test whether or not a 82 percent correct classification rate is

**TABLE 1**
**CLASSIFICATION RESULTS**

**Predicted Results**

**HGPF - RSF Classification**

| Actual Results | HGPF | RSF |
|---|---|---|
| HGPF | 38 | 12 |
| RSF | 5 | 45 |

statistically significant, the Press's Q test is appropriate (Hair et al, 2010). Press's Q is a Chi-square random variable:

$$\text{Press's Q} = [N - (n \times k)]^2 / N(k-1) \quad (3)$$

Where:
N = Total sample size
n = Number of cases correctly classified
k = Number of groups

In this case:

$$\text{Press's Q} = [100 - (83 \times 2)]^2 /100(2-1) = 43.56 > \chi^2_{.05}\ 3.84 \text{ with one d. f.} \quad (4)$$

The null hypothesis that the percentage classified correctly is not significantly different from what would be classified correctly by chance is rejected. The evidence suggests that the discriminant function performed very well in separating the two groups. Again, given the disparity of the two groups, it is not surprising that the function classified eighty three percent correct.

The arithmetic signs of the adjusted coefficients in Table 2 are important to answer question number three. A positive sign indicates that the greater a firm's value for the variable, the more likely it will be in the HGPF group. On the other hand, a negative sign for an adjusted coefficient signifies that the greater a firm's value for the variable, the more likely it will be classified in the RSF group. Thus, according to Table 2, the greater the values for return to total capital, cash flows per share, stock price stability, and the ratio of market value to book value the more

likely the company would be classified as a firm with high growth potential during a recession. Conversely, lower the levels of both financial and operating risk thee more likely the company would be classified as a firm with high growth potential during a recession. In addition, the HGPF had a lower level of earnings predictability.

The relative contribution of each variable to the total discriminating power of the function is indicated by the discriminant loadings, referred to by SPSS as the structure correlations, and given by the SPSS structure matrix. The loadings measure the simple correlation between each independent variable and the Z scores calculated by the discriminant function. The value of each loading will lie between +1 and -1. The closer the absolute value of the loading to 1, the stronger the relationship between the discriminating variable and the discriminant function (Sharma, 1996). These discriminant loadings (structure correlation coefficients) are given in the output of the SPSS 19.0 program, and shown here with their ranking in Table 2.

**TABLE 2**
**RELATIVE CONTRIBUTION OF THE VARIABLES**

| Discriminant Variables | Coefficient | Rank |
|---|---|---|
| X2 - Cash Flow Per Share | 0.453 | 1 |
| X1 - Return to Total Capital | 0.398 | 2 |
| X6 - The Ratio of Market Value to Book Value | 0.386 | 3 |
| X3 - Hamada's Unlevered Beta (Operating Risk) | -0.306 | 4 |
| X7 - Earnings Predictability | -0.298 | 5 |
| X4 - Long Term Debt to Total Capital | -0.208 | 6 |
| X5 - Value Line's of Stock Price Stability | 0.130 | 7 |

Table 2 reveals that the measure of cash flow per share made the greatest contribution to the overall discriminating function. It is followed respectively by measures of return to total capital, the ratio of market value to book value, the measure of operating risk, earnings predictability the measure of financial risk, and finally Value Line's measure of stock price stability. Some multicollinearity may exist between the variables, because return and safety of investment may be a partial function of risk and leverage. Hair, et al (2010) wrote that this consideration becomes critical in stepwise analysis and may be the factor determining whether a variable should be entered into a model. However, when all variables are entered into the model simultaneously, the discriminatory power of the model is a function of the variables evaluated as a set and multicollinearity becomes less important. Sharma (1996) simply stated the obvious that correlation coefficients are not affected by multicollinearity.

## VALIDATION OF THE MODEL

Before any general conclusions can be drawn, a determination must be made on whether or not the model will yield valid results for any group of randomly drawn firms. The procedure used here for validation is referred to as the Lachenbruch or, more informally, the "jackknife" method. In this method, the discriminant function is fitted to repeatedly drawn samples of the original sample. The procedure estimates (k - 1) samples, and eliminates one case at a time from the original sample of "k" cases (Hair

et al, 2010). The expectation is that the proportion of firms classified correctly by the jackknife method would be less than that in the original sample due to the systematic bias associated with sampling errors. The major issue is whether the proportion classified correctly by the validation test differs significantly from the 83 percent classified correctly in the original test. That is, is the difference in the two proportions classified correctly by the two tests due to bias? The objective is to see if this bias is significant. The jackknife validation resulted in the correct classification of 80 percent of the firms. Since there are only two samples for analysis the binomial test is appropriate:

$$t = r - n\,p \,/\, [n\,p\,q]^{1/2} \tag{5}$$

Where:

t is the calculated t statistic.
r is the number of cases classified correctly in the validation test.
n is the sample size.
p is the probability of a company being classified correctly in the original test.
q is the probability that a firm would be misclassified in the original test.

In this case:

$$80 - 100\,(.83) \,/\, [100\,(.83)\,(.17)]^{1/2} = -.80 \text{ is less than } t_{05}\ 1.645 \tag{6}$$

Thus, the null hypothesis that there is no significant difference between the proportion of firms classified correctly in the original test and the proportion classified correctly in the validation test cannot be rejected. Therefore, it can be concluded that while there may be some bias in the original analysis, it is not significant. The procedure will classify new firms as well as it did in the original analysis.

In addition to the validation procedure, researchers usually address the question of the equality of matrices. One of the assumptions in using MDA is that the variance-covariance matrices of the two groups are equal. The SPSS program tests for equality of matrices by means of Box's M statistic. In this study Box's M transformed to the more familiar F statistic of 8.42 resulted in a .000 level of significance. Thus, the null hypothesis that the two matrices are equal cannot be rejected, and the midpoint value between the two group means can be defined as the critical Z value.

## SUMMARY AND CONCLUSIONS

The purpose of this study was to establish a financial profile of firms that were identified as the fifty firms in Value Line database with the highest three to five year growth potential, and to further determine whether or not these firms have financial profiles that are significantly different from firms select¬ed at random. The results of the statistical analysis indicated first, that there was a significant difference between financial variables that determine value, between the group of firms characterized as having the high growth potential during a period of recession and financial market turmoil and firms and firms chosen randomly, but from the same industries as the first group. The fact that the discriminant function separated two heterogeneous groups, and classified a significant proportion correctly is no surprise. In fact, the

two groups of firms contain enough diversity in potential growth that it would certainly have been a surprise if the discriminant function had not been so efficient.

It was suggested earlier that the HGPF group would have a unique financial profile. Table 2 summarizes the findings. According to Table 2, the group with the highest potential for growth was characterized by 1) higher cash flows per share, 2) higher returns to total capital, 3) higher ratios of market value to book value, and 4) higher levels of stock price stability. Conversely those firms had 1) less of both operating and financial risk, and 2) a lower level of earnings predictability.

Explanations of why the variables are associated with one group or the other are beyond the scope of this study. However, a few comments on the findings may be in order. The findings that the HPGF were associated with higher returns, cash flows, stock price stability and the ratio of market value to book value may have been expected. There were no aprori expectations regarding the measures of risk. They were not associated with the HPGF. That is, the HPGF group had less of both types of risk. It could be argued that the firms that had the higher returns to total capital would also have higher levels of both types of risk given the basic financial tenet of a risk-return tradeoff, and given that potential growth may require some additional fixed financial and operating costs. Thus, regardless of the basic tenet, there was no real surprise in this result. It was simply not known.

The study resulted in one surprise. The measure of earnings predictability was not associated with the HPGF. That group had a lower level of earnings predictability than firms chosen at random. This is inconsistent with the fact that the measure of stock price stability was associated with the HPGF, and may well be inconsistent with the aforementioned Graham, Campbell, and Rajgopal (2005) study. That result may defy logic. There will be no attempt here to analyze why the variable profile is as it is, but given the interest in firms with potential growth and the subject of economic recessions and financial market turmoil further study is warranted.

This study has resulted in a contribution toward the construction of a theory that describes the risk-return characteristics of firms that were identified by Value Line as the fifty firms in their database with the highest three to five year potential for growth in an economic recession. In order to make a concrete contribution, further research will be needed. The construction of a complete theory would aid managers, investors, academicians, and investment counselors by providing greater of knowledge on which to base financial and other decisions.

**ENDNOTES**

[1]Value Line Stock Price Stability This is a measurement based on the ranking of the standard deviation of weekly percent changes in the price of a stock over the past five years. The lower the standard deviation, the more stable the stock. The higher the standard deviation, the more volatile the stock. The most stable stocks, those in the top 5%, have a Price Stability Index of 100. The next 5% are ranked 95, and so on down to 5. Stocks with ranks of 50 and 55 are average.
http://www.valueline.com/sup_glosss.html

[2]Value Line Earnings Predictability. This is a measurement of the reliability of an earnings forecast. Predictability is based on the stability of year-to-year quarterly

earnings comparisons. The earnings stability is calculated from the standard deviation of the percent changes in quarterly earnings over a 10-year period with recent years being weighted more heavily than earlier years. The very highest score, that given the companies with the most stable and predictable earnings, is 100, the lowest 5 (Value Line, 2008).
http://www.investorhome.com/anomvl.htm

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